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REMARKS

Reexamination of the captioned application is respectfully requested.

A. SUMMARY OF THIS AMENDMENT

By the current amendment, Applicant basically:

1. Thanks the Examiner for the indication of allowable subject matter in claims 18, 53, 84, and 92 - 93, but continues to pursue the remaining claims.
2. Amends independent claims 1, 6, 19, and 36 (see Section C infra).
3. Adds new claims 94 - 98 (see Section C infra).
4. Cancels claims 65 and 66 without prejudice or disclaimer.
5. Respectfully traverses the rejection 35 USC §112, under second paragraph (see Section B infra).
6. Respectfully traverses all prior art rejections (see Section D infra).

B. THE CLAIMS ARE DEFINITE

On its second page, the Office Action raises an objection under 35 USC §112, second paragraph, complaining that claims 1, 36, 65, 67 and 88 use of the term "virtual active set of base stations". Applicant respectfully traverses this rejection.

By citing *Process Control*, it appears that the Office Action first alleges that use of the phrase "virtual active set of base stations" by Applicant is a use contrary to ordinary meaning of the phrase. But the Office Action makes no showing as to how the phrase "virtual active set of base stations" is contrary to any ordinary meaning.

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In any event, the phrase "virtual active set of base stations" is clearly defined in the specification. For example, note the third full paragraph on page 13 of the specification:

Cells which belong to a virtual active set on a specific frequency (e.g., second or new frequency) are the cells that would be considered the active set on that specific frequency if the user equipment unit (UE) were tune to use that frequency. The user equipment unit (UE) provides measurements relative to both the active set and the virtual active set(s). Then, when measurements so warrant, the network issues an inter-frequency handover command to the user equipment unit (UE), so that the user equipment unit (UE) then uses the new frequency rather than the first frequency. That is, the telecommunications network performs an inter-frequency hard handover for a connection with user equipment unit (UE) 30 by switching from a current active set of base stations on a first frequency to the virtual active set of base stations on another (new) frequency. (emphasis added)

Applicant submits that it is clear from this passage, as well as the rest of the specification, what is meant by the phrase "virtual active set of base stations". While this passage does refer to "virtual active set" in terms of cells, such is certainly understandable to the person skilled in the art from this very passage itself (which equivalently at its conclusion refers to a virtual active set of base stations) as well from the specification's use of "base station" and "cells" essentially interchangeably, since

In a typical cellular radio system, a geographical area is divided into cell areas served by base stations which are connected to a radio network. (See page 1, line 10+ of the specification).

If the Examiner so desires and specifically requests, Applicant could certainly amend the phrase instead to be the equivalent phrase "virtual active set of cells" if such is the basis of the concern.

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Thus, contrary to the allegations of the Office Action, the phrase "virtual active set of base stations" is not unknown, but clearly defined in and understood from the specification.

The Office Action inquires whether the phrase "virtual active set of base stations" is, e.g., utilized in a standard. As was explained at the July 22, 2003 Office Interview, Applicant's invention, and the phrase "virtual active set", has been incorporated in the 3GPP Technical Standard TS 25.331 V.3.14.0. *See*, for example, section 10.3.7.22 and section 10.3.7.61. Therefore, Applicant's phrase "virtual active set", clearly defined in Applicant's specification, has now become well known, e.g., by use in the Standard.

C. AMENDMENTS TO THE CLAIMS AND NEW CLAIMS

For sake of emphasizing what already was clear in the claims, independent claims 1, 6, 36, and 41 have been amended to stress that the measurements respecting signals on the second frequency for the respective plural base stations of the virtual active set are performed while the user equipment unit communicates with the telecommunications network using one of the cell or the current active set of base stations on the first frequency. The "while communicating..." phrase of these independent claims was intended to and did modify both the "maintaining" and "measuring" operations, but now its repetition in the claims unmistakably does so.

New dependent claims 94 - 98, dependent upon independent claims 1, 6, 36, 41, and 67, respectively, specify that the user equipment unit can switch to the virtual active set of plural base stations without making measurements respecting the signals on the second frequency after a determination an inter-frequency handover should be performed and before using the virtual active set of plural base stations as a new active set. For support, *see*, e.g., the paragraph bridging pages 14 and 15 of the specification; the first full paragraph on page 15; the end of the first full paragraph of page 24; the first and next to last full paragraphs on page 38; as well as the timing diagram figures.

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D. PATENTABILITY OF THE CLAIMS

Claims 1-17, 19-20, 37-52, 54-55, 57-83, 85-86 and 88-91 under 35 USC §103(a) as being unpatentable over U.S. Patent 5,848,063 to Weaver Jr. et al and further in view of U.S. Patent 6,097,954 to Kumar et al. Claims 21, 56 and 87 stand rejected under 35 USC §103(a) as being unpatentable over U.S. Patent 5,848,063 to Weaver Jr. et al, U.S. Patent 6,097,954 to Kumar et al and U.S. Patent 5,999,816 to Tiedermann et al and further in view of U.S. Patent 6,285,883 to Bringby. All prior art rejections are respectfully traversed for at least the following reasons.

The independent claims all require that the user equipment unit, while communicating with a telecommunications network using one of a cell or a current active set of base stations on a first frequency, both (1) maintain a virtual active set of base stations on a second frequency and (2) perform measurements respecting signals on the second frequency for the respective plural base stations of the virtual active set. The user equipment unit (UE) switches to the virtual active set of base stations upon performance of an inter-frequency handover.

That the measurements respecting signals on the second frequency are performed while the user equipment unit uses the current active set is emphasized by the current amendments to independent claims 1, 6, 36, and 41, and was already readily apparent in independent claim 67. In independent claim 67, the "while communicating..." clause clearly modified the "performs measurement" operation which it immediately preceded in textual order, and (moreover) independent claim 67 states that the "virtual active set can essentially immediately be utilized as the active set .." (emphasis added).

An advantage of Applicant's technique is that, upon completion of the switch and the inter-frequency handover, the user equipment unit has an already-prepared set of pre-qualified base stations on the second frequency with which to operate. That is, upon the switch, the virtual active set immediately becomes the active set. At the switch to the

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second frequency there is no time lost in trying to determine which second frequency cells quality for use in the (new) active set.

Applicant's claim limitations and foregoing advantage are simply not taught or suggested by any applied reference or combination of applied references.

1. U.S. Patent 5,848,063 to Weaver Jr. et al

Nowhere does U.S. Patent 5,848,063 to Weaver Jr. et al teach or suggest a user equipment unit which performs measurements on second frequency signals of a second frequency system while the user equipment unit is still operating in a first frequency system. As previously explained, Weaver's hard handover scenarios (handovers from a first frequency system to a second frequency system) do not teach or suggest Applicant's claim limitations.

In the above regard, Weaver has two modes of hard handover, but neither mode involve performing measurements on second frequency signals of a second frequency system while the user equipment unit is still operating in a first frequency system. In a first mode, Weaver can trigger a hard handover when in a first frequency system by measuring a pilot signal of the second frequency system, but the pilot signal of the second frequency system is on a first frequency -- and therefore is not a second frequency signal!¹

¹ In order to ascertain whether to switch from an existing system with a currently utilized (old) frequency to a new system with a new frequency, Weaver's mobile monitors an old frequency signal emitted from the new system. See, e.g., the discussion of the pilot signal in the first paragraph of column 21, and the discussion of Fig. 14 and Fig. 15 which begins in col. 26 and continues into col. 27. In other words, the remote unit of Weaver does not perform measurements on frequencies operated by base stations other than those of the frequency of the Weaver active set. For this and other reasons, Weaver does not anticipate or provide a basis for denying the patentability of Applicant's claims.

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In another mode, Weaver triggers a hard handover by determining round trip delay (RTD) of the first frequency signal from the existing system, and when the first frequency signal delay time is excessive, handing off to the second frequency. The Weaver second mode thus does not involve measurements on the second frequency of the new system, but rather has an automatic switch or hard handover if the RTD of the first frequency signals exceeds a stored value².

Heretofore the Examiner has seemed enamoured with Weaver's description of neighbor set and candidate set, and has tended to confuse these sets with Applicant's virtual active set. Applicant has contended, without rational rebuttal, that Weaver's neighbor set and candidate set cannot be the claimed virtual active set since, e.g., Weaver's neighbor set and candidate set are described in context of soft handover³ and therefore (unlike the virtual active set) must be on the same frequency, e.g., the first frequency.

It is true that Weaver discusses hard handoffs between systems having different frequencies. But to conclude baldly (as the Examiner does in subparagraph a on page 3 of the Office Action) that disclosure of the use of different frequencies per se reads on Applicant's claims is improper and ignores Applicant's claim language. The Examiner must fairly treat instead the totality of the claims, including the requirement that measurements respecting signals on the second frequency for the respective plural base stations of the virtual active set be performed while the user equipment unit is communicating with the telecommunications network using one of the cell or the current

² This is confirmed by MDHO Table 1 (see cols. 19 and 20) and col. 23, lines 53+.

³ Weaver's references to "sets" (whether neighbor, candidate, or active) are *entirely* in the context of soft handoff. Moreover, it only stands to reason that if a base station can migrate from a neighbor set to a candidate set to an active set as described in col. 13, lines 46+, the base station must be on the same frequency as the active set. Therefore, Weaver's neighbor set or candidate set cannot be the claimed virtual active set (since the virtual active set must be on a different frequency from the active set).

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active set of base stations on the first frequency, so that the user equipment unit can switch to the virtual active set of plural base stations upon performance of an inter-frequency handover.

In the first full paragraph on page 4 of the Office Action it is observed that Weaver will have the ability to keep track of the different sets of frequencies available for each possible handoff scenario. But the clear fact remains, despite this conjecture, that Weaver simply does not teach or suggest measuring on signals of the second frequency while still operating in a first frequency system. Weaver's two modes of hard handoff from different frequency systems (summarized above) do not involve Applicant's claimed pre-handoff measurements of signals on a different frequency. For the Examiner to suggest that Weaver would measure on the signals of the second frequency system prior to entry into the second frequency system is unjustifiable in the context of Weaver's unmistakeable operation to the contrary, and would appear to occur only through the Examiner's hindsight.

In addition to all said above, Weaver does not switch to a set of plural base stations upon performing a hard handover. Rather, in each of Weaver's hard handover scenarios, Weaver merely switches to a single base station on a new frequency.⁴

⁴ See, for example, the scenario described in col. 10, lines 15 - 45 (in which there is no indication that other base stations besides base station B₂₁ is pre-approved by previous frequency measurements). See also col. 12, lines 14 - 17; col. 22, lines 52 - 53; col. 26, lines 36 - 39; noting that the handover is always merely to a base station. More poignantly, see col. 27, lines 1 - 10 wherein the hard handover is described as first involving the base station corresponding to coverage area C_{1B}, and only thereafter as the remote unit continues toward system S₂ is soft handover used to transition communication to the base station for coverage area C_{2B}. What is missing from Weaver in this regard is any indication of having also pre-established — before the hard handoff — the base station for coverage area C_{2B} in a set along with the base station for coverage area C_{1B}.

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So, not only does Weaver not perform measurements on a second frequency (on which the claimed virtual active set must operate), but also Weaver does not switch to a set of plural base stations (much less the claimed *virtual* active set) upon performance of an inter-frequency handoff.

The Office Action states that Weaver "allows the ability to handoff a user from one cell system to a second, different cell system". In a hard handoff situation Weaver hands off to a cell, but it is not correct to infer that, at the time of inter-frequency handoff, the user equipment unit is in radio contact with a set of cells for which measurements have already been made.

2. U.S. Patent 5,999,816 to Tiedermann et al

U.S. Patent 5,999,816 to Tiedermann et al suffers from some of the same deficiencies as U.S. Patent 5,848,063 to Weaver Jr. et al. Tiedermann makes no frequency measurement prior to hard handoff. Rather, as Tiedermann's mobile approaches a border between an origination system S1 and a destination system S2, the origination system S1 predicts the likely neighbors in the destination system based on a best guess of the location of the mobile, and then notifies the mobile of the PN offsets of the cells in the destination system S2. The origination system S1 then begins to forward traffic to destination system S2 with instructions to set up an appropriate forward link on the most likely target base stations, known as the "new active set"⁵. Then origination system S1 sends an initiation message to the mobile station to begin the hard handoff process. The mobile station then attempts to switch to the new frequency and to find the pilots of the new active set (col. 5, lines 43+). Tiedermann's mobile does not, while still using the frequency of origination system S1 or even prior to the decision to make a hard handoff, attempt to measure on signals of destination system S2 (*see, e.g., col. 3, lines 33*

⁵ Since Tiedermann "notifies the mobile of the PN offsets of the cells in the destination system S2" (emphasis added), it is possible that the new active set for Tiedermann is a set of cells having different frequencies.

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- 45). Only after the attempted hard handoff does Tiedermann attempt to acquire signals from destination system S2.

So only after the attempted hard handoff does Tiedermann's mobile measure on the new active set. In fact, Tiedermann is predominately concerned with what could happen if the energy level of the new system is not sufficient to justify the hard handoff, for which reason Tiedermann features error recovery scenarios in the hope of avoiding dropped calls during inter-system hard handoff (see col. 3, lines 19+).

3. U.S. Patent 6,097,954 to Kumar et al.

U.S. Patent 6,097,954 to Kumar et al. does not rehabilitate U.S. Patent 5,848,063 to Weaver Jr. et al, U.S. Patent 5,999,816 to Tiedermann et al, or any combination thereof. Kumar et al defines active set and neighbor set⁶, but never uses the term "candidate set" as imputed or presumed by the Office Action. Rather, Kumar uses the sole word "candidate" in the sense of "a candidate base station". In so doing, Kumar uses the "candidate base station" in the sense of a sole target base station in the context of a soft handover. See, e.g., col. 5, lines 40 - 42: "Note that the base station 26-3 is now a candidate base station, i.e., *a base station to which a soft handoff is requested*" (emphasis added). Kumar never speaks of a soft handoff as resulting in a new set of base stations being active base stations. Kumar does not discuss inter-frequency handoff in detail, and accordingly makes no suggestion regarding a new set of active base stations being immediately available upon completion of an inter-frequency handoff.

⁶ In the paragraph bridging cols 3 and 4 Kumar reads as follows: "The active set typically includes a primary base station, i.e., base station in control of call processing for the mobile-telephone, and zero or more secondary base stations, i.e., base stations in communication with the mobile-telephone other than the primary base station. The neighbor set includes base stations that are close and/or adjacent to the primary base station. The primary base station provides the mobile-telephone with a list indicating the base stations in the active set and the neighbor set."

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There is a difference between a candidate base station and candidate set. The term "candidate base station" is usually employed (as in Kumar) in terms of a likely base station which, as a result of a soft handover, may acquire the role of the primary base station. The "candidate set", on the other hand, is a group of base stations whose signals are monitored for the prospect that they may eventually become part of the active set for a remote unit (see col. 13, lines 45+ of Weaver). And, as explained above, moving a base station into a candidate set (e.g., from a neighboring set) is merely a reclassification of base stations which operate on a same frequency for the purpose of supporting the existing active set. This has nothing to do with maintaining a virtual active set of base stations on a second frequency which immediately becomes the active set upon an inter-frequency handoff.

Both the "candidate base station" as in Kumar and the "candidate set" of Weaver are in strict context of soft handover. Neither reference teaches, or forms any basis of suggesting, switching to a virtual active set of plural base stations as the active set upon performance of an inter-frequency handover.

4. U.S. Patent 6,285,883 to Bringby

U.S. Patent 6,285,883 to Bringby is understood to be applied only for its alleged pertinence to hysteresis protection. Applicant reserves the right to defuse in the future any controversy engendered by Bringby. However, in view of the fact that Bringby is not alleged to rectify any of the deficiencies of the primary and secondary references regarding the independent claims, and in view of Applicant's belief that the prior art rejections of the independent claims are manifestly overcome, there appears no need to treat U.S. Patent 6,285,883 to Bringby at this time.

5. Features of Various Selected Dependent Claims

Features of various dependent claims have separate patentable merit, examples of which are discussed below.

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New dependent claims 94 - 98 explicitly require that the user equipment unit to switch to the virtual active set of plural base stations without making measurements respecting the signals on the second frequency after a determination an inter-frequency handover should be performed and before using the virtual active set of plural base stations as a new active set. That the limitations of claims 94 - 98 are unmet and unsuggested by the applied references is manifest from the foregoing discussion. Note that only after Tiedermann determines that a hard handover should be performed does Tiedermann make measurements regarding destination system S2.

Dependent claims 4, 39, and 70 specify that the measurement trigger criteria which causes the user equipment unit to perform and report inter-frequency measurements for the second frequency is the same criteria which is employed to cause the user equipment unit to perform and report intra-frequency measurements for the first frequency. Since the applied references do not teach at all inter-frequency measurements for the second frequency when operating on the first frequency, it is incredulous to allege that the applied references teach or suggest the limitations of these dependent claims.

Dependent claims 11, 46, and 77 involve the user equipment unit receiving from the network an authorization message that allows the user equipment unit to update autonomously the virtual active set of base stations. Nowhere do the applied references do not teach or suggest a user equipment unit maintaining, much less autonomously updating, a virtual active set. The advantage of autonomous updating is that authorization can occur by the network specifying events that should trigger a virtual active set update (instead of having the user equipment unit (UE) send a measurement report to the network and wait for a measurement control order that contains a virtual active set update) [see, e.g., the first full paragraph of page 7 of the specification]. Note that even in U.S. Patent 5,999,816 to Tiedermann et al the best guess list of base stations of destination system S2 is simply downloaded from the network.

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Numerous other dependent claims also have patentable features, but should not require elaboration in view of the manifest patentability of claims from which they depend.

E. MISCELLANEOUS

In view of the foregoing and other considerations, all claims are deemed in condition for allowance. A formal indication of allowability is earnestly solicited.

The Commissioner is authorized to charge the undersigned's deposit account #14-1140 in whatever amount is necessary for entry of these papers and the continued pendency of the captioned application.

Should the Examiner feel that an interview with the undersigned would facilitate allowance of this application, the Examiner is encouraged to contact the undersigned.

Respectfully submitted,

NIXON & VANDERHYE P.C.October 30, 2003By: 

H. Warren Burnam, Jr.

Reg. No. 29,366

HWB:lsb
1100 North Glebe Road, 8th Floor
Arlington, VA 22201-4714
Telephone: (703) 816-4000
Facsimile: (703) 816-4100